

Patent
10/673,889

CLAIMS AS PRESENTED IN OCTOBER 23, 2005 AMENDMENT (not entered)

1-13. (Canceled)

14. (Original) A method of forming a power MOSFET comprising the steps of:
providing a substrate of a first conductivity type;

depositing an epitaxial layer on the substrate, said epitaxial layer having a first conductivity type;

forming first and second body regions in the epitaxial layer to define a drift region therebetween, said body regions having a second conductivity type;

forming first and second source regions of the first conductivity type in the first and second body regions, respectively; and

forming a plurality of trenches in said drift region of the epitaxial layer;
epitaxially depositing in said trenches a material having a dopant of the second conductivity type, said trenches extending toward the substrate from the first and second body regions; and

diffusing at least a portion of said dopant from said trenches into portions of the epitaxial layer adjacent the trenches.

15. (Original) The method of claim 14 wherein said epitaxially deposited material filling the trench includes silicon.

16. (Canceled)

17. (Currently Amended) The method of claim 14 ~~wherein said 15 further comprising the step of forming a layer of dielectric on the epitaxially deposited material filling the trench in silicon dioxide.~~

2 18. (Original) The method of claim 14 wherein said dopant is boron.

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19. (Currently Amended) The method of claim 15 further comprising the step of forming a layer of thermal oxide on the epitaxial layer of silicon deposited in the trench at least partially oxidizing said silicon.
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20. (Currently Amended) The method of claim 14 wherein ~~said material filling the trench includes silicon and a dielectric~~ a layer of epitaxial silicon is deposited on the original trench walls and a layer of dielectric is formed on said epitaxial layer, thereby filling the trench.
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21. (Currently Amended) The method of claim 14 wherein said body regions include deep body regions that are deeper than the first body region but shallower than p-type regions formed around the trenches.
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22. (Original) The method of claim 14, wherein said trench is formed by providing a masking layer defining at least one trench, and etching the trench defined by the masking layer.
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23. (Original) The method of claim 14, wherein said body region is formed by implanting and diffusing a dopant into the substrate.
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24. (Original) The method of claim 14 wherein the epitaxially depositing step includes the step of epitaxially depositing a plurality of layers, at least two of said layers having different dopant concentrations.
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25. (Original) The method of claim 24 wherein said plurality of layers includes an interface layer adjacent to one of the body regions, said interface layer having a lower dopant concentration than an interior layer of the epitaxially layered material.
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26. (Original) The method of claim 14 wherein said epitaxially layered material has a dopant concentration that is reduced in the vicinity of the body regions relative to the dopant concentration profile in the vicinity of the substrate.

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~~11~~ 27. (Currently Amended) The method of claim ~~14~~ wherein said portions of the epitaxial layer adjacent the trenches have a substantially uniform dopant concentration in a direction lateral to the trenches, and have an opposite doping type to that of the epitaxial layers deposited on the substrate.

~~12~~ 28. (Currently Amended) The method of claim ~~26~~ wherein said portions of the epitaxial layer adjacent the trenches have a substantially uniform dopant concentration in a direction lateral to the trenches, and have an opposite doping type to that of the epitaxial layers deposited on the substrate.

~~13~~ 29. (Original) A power MOSFET made in accordance with the method of claim

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